Federal Emergency Management Agency

Washington, D.C. 20472

October 10, 2000

Ms. Kit Smith
Richland County Council Chairperson
2020 Hampton Street
P.O. Box 192
Columbia, South Carolina 29202

Mr. Johnny Jeffcoat
Lexington County Council Chairman
212 South Lake Drive
Lexington, South Carolina 29072

The Honorable Robert D. Coble
Mayor of the City of Columbia
1737 Main Street
Columbia, South Carolina 29201

Dear Ms. Smith, Mr. Jeffcoat, and Mayor Coble:

This letter is in follow-up to a meeting held on October 4, 2000, at the Federal Emergency Management Agency's (FEMA's) headquarters in Washington, D.C. Representatives of FEMA, Lexington County, Richland County, the City of Columbia, and Columbia Venture attended this meeting. A list of attendees with telephone and facsimile numbers is enclosed with this letter. Many important questions were asked in this meeting; this letter serves as a record of these questions and FEMA's formal responses. In addition, this letter provides an opportunity for clarification. The questions and answers are listed below in approximately the order that they occurred in the meeting.

1. *If we proposed construction in the Richland County floodway landward of Manning's dike, which hydraulic model should we use to evaluate impacts on water-surface elevations, i.e., to demonstrate "no-rise"?* [redacted]

   Impacts of proposed construction within the Richland County floodway landward of Manning's dike should be evaluated using the HEC-2 hydraulic model used to compute Base Flood Elevations (BFEs) landward of Manning's dike. This model reflects conveyance in the Richland County floodplain and is named CongRC2k.dat in the September 26, 2000, report and CD. Please note that this model shows lower elevations than the model used to compute BFEs riverward of Manning's dike. It should be pointed out that while minimum National Flood Insurance Program (NFIP) requirements allow "no rise" construction in the floodway, Richland County regulations may be more prohibitive of construction in a floodway. Where local restrictions exceed minimum NFIP requirements, the local criteria take precedence.

2. *The 2-dimensional models consider several dike failures, which would have to occur sequentially. How was the time-dependent nature of this sequential failure considered?* [redacted]

The 2-dimensional model was run in steady-state mode, which is a "snapshot" of the peak of the flood along the Congaree River. Because none of the dikes in the Richland County floodplain meet the requirements in Section 65.10 of the NFIP, they were considered completely removed for analysis purposes. When we evaluated likely breach scenarios, we considered the lower Gill's Creek ring dike completely removed because it is overtopped by downstream flooding from the Congaree River. The time required for multiple failures to occur was considered in that we know the 1976 flood, an approximately 10% annual chance (10-year) flood, maintained a high stage for nearly four days. A 1% annual chance (100-year) flood should maintain a high stage for at least as long, thus providing adequate time for multiple failures to occur. Also, the failures would not necessarily occur sequentially.

3. *Why was a discharge of 364,000 cfs used in some of the RMA-2 2-dimensional models? What other discharges were used?* [redacted]

The hydrologic and hydraulic analyses were developed simultaneously; therefore, a discharge of 364,000 cfs, the same as the 1908 flood, was used in the early development of the hydraulic model to determine ineffective flow areas. Once the 1% annual chance discharge was finalized, the 1% annual chance discharge of 292,000 cfs was used in all other RMA-2 models and was used to determine flow paths and velocities. We have verified that using a discharge of 292,000 cfs generates the same ineffective flow areas.

4. *What percentage of flow behind Manning's dike is reflected in the floodway and BFE computations?* [redacted]

Two-dimensional model results indicate that this is as much as 25% of the total Congaree River discharge. However, as per standard NFIP mapping guidelines, the floodway and BFE computations are based on flow that would occur in Richland County if no dikes were present.

5. *The South Carolina Department of Transportation (SCDOT)/U.S. Geological Survey (USGS) reports on development of the 2-dimensional model indicate that no flow occurs landward of Manning's dike. How and why does FEMA's model differ?* [redacted]

SCDOT and USGS developed their models with a different objective than FEMA. SCDOT and USGS were sizing bridge crossings over the Congaree River floodplain, with the objective of designing Interstate Route 77 to be passable for emergency services and evacuations in a very large flood. Their approach results in very large openings. FEMA's objective is to accurately determine 1% annual chance flood hazards based on existing conditions for flood insurance and floodplain management applications. In addition, limitations in computers at the time of the SCDOT/USGS study in the late 1970s, forced them to divide the floodplain into three models: one for the Richland

County floodplain, one for the Lexington County floodplain, and one for the main channel. SCDOT/USGS ran the entire discharge of 364,000 cfs through each model. FEMA combined these into one model for the entire floodplain and ran the 1% annual chance discharge through the entire floodplain.

6. *Lake Murray Dam has been retrofitted several times since 1940. Were historical flood data adjusted to take this into account?* [redacted]

No. While the dam has been modified since its construction, FEMA has not received a definitive operating plan for Lake Murray Dam, nor any calculations of the downstream discharge during the 1% annual chance flood, based on a definitive operating plan. The peak flows prior to 1929 were adjusted to account for the regulating effect of Lake Murray Dam as it was operated during the period 1930 to 1983.

7. *Did FEMA perform library research into historical flood peaks prior to the USGS systematic record?* [redacted]

No. The only data reviewed by FEMA were provided by appellants. These data indicated that the 1908 flood was the largest since at least 1852. The historical peak flows were not used in the frequency analysis. This conclusion was cross-checked to the longer systematic record for the Savannah River. The pre-1892 newspaper accounts of flooding indicate a period of significant flows and support the importance of considering recorded flows prior to the installation of Lake Murray Dam.

8. *Please clarify the meaning of Figure 2 in the September 26, 2000, report.* (John Carrigg)

The yellow highlighted sections are sections where a failure is likely. This figure is not intended to indicate that all yellow highlighted sections will fail.

9. *Manning's dike has been in place since the turn of the century. Why does FEMA assume that it will fail now?* (John Carrigg)

NFIP regulations Section 65.10 specifies criteria that FEMA must consider when certifying a dike or levee; any dike or levee that cannot be certified must not be considered as providing protection from the 1% annual chance flood in analyses and mapping. Among these criteria is that the top of a dike or levee must be at least 3.0 feet above the BFE; this is called freeboard. Freeboard is important because of uncertainty inherent in hydrologic and hydraulic analyses and because debris can cause increases in water-surface elevations, leading to overtopping not predicted by the BFE. Manning's dike does not meet these criteria.

10. *The Upper Mississippi River study currently being formulated by the U.S. Army Corps of Engineers (USACE) assumes that no levee breaches occur until overtopping occurs, and that the breach will constitute ineffective flow. Why aren't these assumptions used in the Congaree River study?* [redacted]

The USACE study was initiated for reasons other than NFIP mapping. FEMA is investigating funding options to build on the Upper Mississippi River study for NFIP mapping purposes. However, when the study is used to produce updated NFIP maps for the impacted communities, dikes and levees will be evaluated for compliance with Section 65.10 of the NFIP regulations. Those that cannot be certified will be mapped as if they were not there. Assessment of ineffective flow potential will be based on hydraulic conditions at the site of specific levees.

11. *To clarify, the intent of assuming dike failure is to provide BFEs for the landward portion of Richland County.* [redacted]

Yes, that is correct. Because the dike does not meet Section 65.10 requirements, the area behind it must be mapped as floodplain so that those at risk will be aware when making building plans and flood insurance purchase decisions.

12. *Would a levee system based on 3 feet of freeboard on top of the 500-year flood elevation be enough to protect developments landward of the levee?* [redacted]

If all other aspects of Section 65.10 of the NFIP regulations were met, this system would meet the NFIP minimum requirements to be shown as providing protection on the Flood Insurance Rate Maps (FIRMs). However, this is a matter of risk management. All levee systems have a possibility of failure. The developer and the affected communities must decide the acceptable level of risk.

13. *Procedurally, what do we need to do to improve the dikes?* [redacted]

Because it is the responsibility of the impacted jurisdiction to manage all development within its floodplains, Richland County would have to approve any physical modifications to the dike. Additionally, because the dike is in an adopted floodway, any modifications will have to comply with the requirements of Section 60.3(d)(3), or a floodway revision would have to be made to remove the area from the floodway. These changes would also need to be coordinated with any other impacted jurisdictions, such as Lexington County, and the cities of Cayce, Columbia and West Columbia.

Floodway revisions can be made if engineering analysis supports an alternative floodway configuration that meets surcharge and other engineering requirements, and all affected jurisdictions agree to this modification.

14. *How should Richland County use the September 26, 2000, revised preliminary FIRM along with the effective FIRM for floodplain management purposes?* (Kit Smith)

According to the NFIP regulations, a community may use its effective FIRM for floodplain management purposes until FEMA issues a Letter of Final Determination finalizing the preliminary FIRM. After that, the community should use the FIRM defined by the Letter of Final Determination as best available data for floodplain management. As explained at the meeting, there is a 6-month period between the date of the Letter of

Final Determination and the effective date of the new FIRM. After the 6-month period, flood insurance applications of the program will be based on the new FIRM.

15. *If the September 26, 2000, revised preliminary FIRM becomes finalized, how should Richland County deal with variances, such as for expansion to Heathwood Hall School or the City of Columbia wastewater treatment plant?* (Kit Smith)

There are several possibilities. First, upgrades or direct replacements can be made on a 1:1 ratio of building footprint area. Second, building standards could mandate that buildings do not impede flood flow, such as construction elevated on piles to allow flow under the buildings. Third, the floodway configuration could be altered, as discussed in the answer to question number 13. Variances and exceptions are further discussed in Section 60.6 of the NFIP regulations.

16. *Are there any provisions requiring the retrofitting of existing structures in the floodway?*

Buildings construction prior to adoption of the new FIRM would not be subject to new standards unless a structure is substantially improved, or repaired after being substantially damaged. Substantial improvement is defined as any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which exceeds 50% of the market value of the structure before the "start of construction" of the improvement. Substantial damage is defined as damage of any origin sustained by a structure whereby the cost of restoring the structure to its pre-damage condition would equal or exceed 50% of the market value of the structure before the damage occurred. In these cases, full compliance with the elevation requirements must be met.

17. *Does shifting the floodway require making physical changes to the floodplain, or is it simply a matter of computer modeling?* (George Wolf)

No physical changes are required. The floodway may be modified as discussed in the answer to question number 13.

18. *Is the 30-day comment period regulatory?* (George Wolf)

No, this comment period is not regulatory, but is a courtesy period extended to communities to provide an opportunity to review and comment on appeal resolutions.

I am also enclosing a document that was prepared in response to questions raised by [redacted]

While reviewing our files, we discovered that the final version of the calibration HEC-2 model was inadvertently excluded from the compact disc distributed on September 26, 2000, and from FEMA's website. This file will be added to FEMA's website today. This file may be accessed by going to http://www.fema.gov/mit/tsd/ST_cong.htm, and following the links for HEC-2 model downloads.

I wanted to again thank the attendees for their participation in the meeting and to emphasize the importance of remaining involved and engaged in this process. FEMA is committed to working with you in exploring alternative floodway configurations that meet FEMA's minimum standards and that provide a sound basis for the consideration of potential future construction in the flood fringe areas of the Congaree River. A meeting to discuss the floodway configuration has been scheduled for October 18, 2000, at 11:00 am at FEMA's Regional Office in Atlanta, Georgia. Any further questions or clarifications should be submitted in writing. We are committed to finalizing the FIRMs for your communities in an expeditious manner and will respond to your inquiries quickly. You may contact me at (202) 646-2756, or by facsimile at (202) 646-4596.

Sincerely,

Michael K. Buckley, P.E., Director
Technical Services Division
Mitigation Directorate

Enclosures

cc: The Honorable Avery B. Wilkerson, Mayor of the City of Cayce
The Honorable Wyman M. Rish, Mayor of the City of West Columbia
All meeting attendees via facsimile

October 4 - Attendance List

NAME	Organization	Phone	FAX
Todd Davison	FEMA R4 - Atlanta	770-220-5401	todd.davison@fema.dhs.gov
Vince Fabrizio	FEMA/HQ	202-646-4500	202-646-3600
Dan Berlond	FEMA/HQ	202-646-2903	
Barbara McCall	City of Columbia	202-892-5430	202-842-5051
KIT SMITH	RICHLAND COUNTY	803 254 0542	25-4241
Greg Pearce	Richland County	803 783-3288	803-647-0912
Lisa Holland	SCDNR	803 734 9120	803 734 9106
Matt Miller	FEMA/HQ	202.646.3461	202.646.4596
MIKE BUCKLEY	"	202-646-2756	"
John Carrigg	Lexington County	803-799-8600	803-799-9202
CHARLIE COMPTON	LEXINGTON COUNTY	803-359-8121	803-359-8188
ART BROOKS	LEXINGTON COUNTY	803-359-8100	803 359-8101
[redacted]	COLUMBIA VENTURES	[redacted]	[redacted]
	Lockwood Green		
MARTHA Braddock	FEMA HQ - Intergovernmental	202-646-4515	202-646-4039
[redacted]	COLUMBIA VENTURE	[redacted]	[redacted]
	BURROUGHS & CHAPIN		
Mary Margaret Walker	FEMA HQ Public Affairs	202-646-4600	202-646-4086
Susan Koshgarian	FEMA HQ - Intergovernmental	202-646-4515	202 646-4039
[redacted]	Michael Baker, Jr.	[redacted]	[redacted]
	Dewberry & Davis LLC		
[redacted]	Dewberry & Davis LLC	[redacted]	[redacted]
MARY HUDAK	FEMA Region 4, Atlanta	770.220.5226	770.220.5230
GARY McSWAIN	RICHLAND COUNTY, SC	803-748-4611	803-748-4644

ON conference by phone:

Leona Plough	Columbia · Asst City Mgr	803·733·8223	
John Dewey	Columbia · Dir Public Utilities	733·8317 FAX	
David Johnson	Columbia · City Engineer		
Mullen Taylor	Richland Cnty · Asst Cnty Mgr	803·748·4616	
George Wolfe	Richland Cnty Counsel	748·4644 fax	
Jack Smith	Richland Cnty Counsel		

[redacted] - Reporter · The State paper [redacted]